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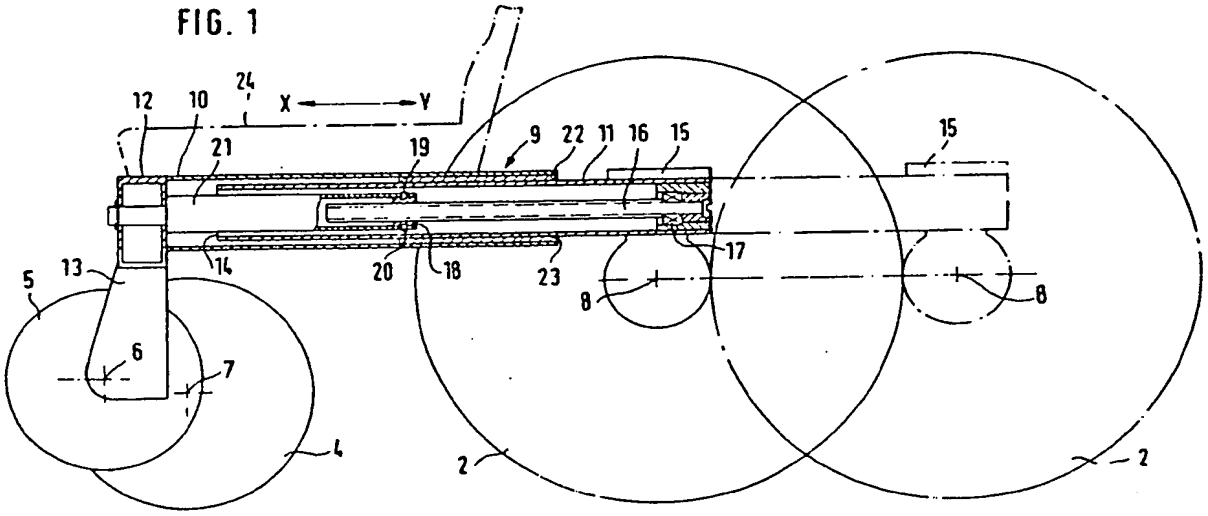
(54) Adjustable wheelchair

(57) A wheelchair comprises a chassis 9 which is longitudinally adjustable. The seat 24 for the user is connected to a front frame section 10 of the chassis which telescopically engages a rear section 11 thereof. Thus, the relative position of the seat 24 and the rear wheels 2 may be adjusted whereby to vary the centre of gravity of the wheelchair. As a result the stability against tipping may be increased when obstructions and obstacles such as kerbs are negotiated.

FIG. 1



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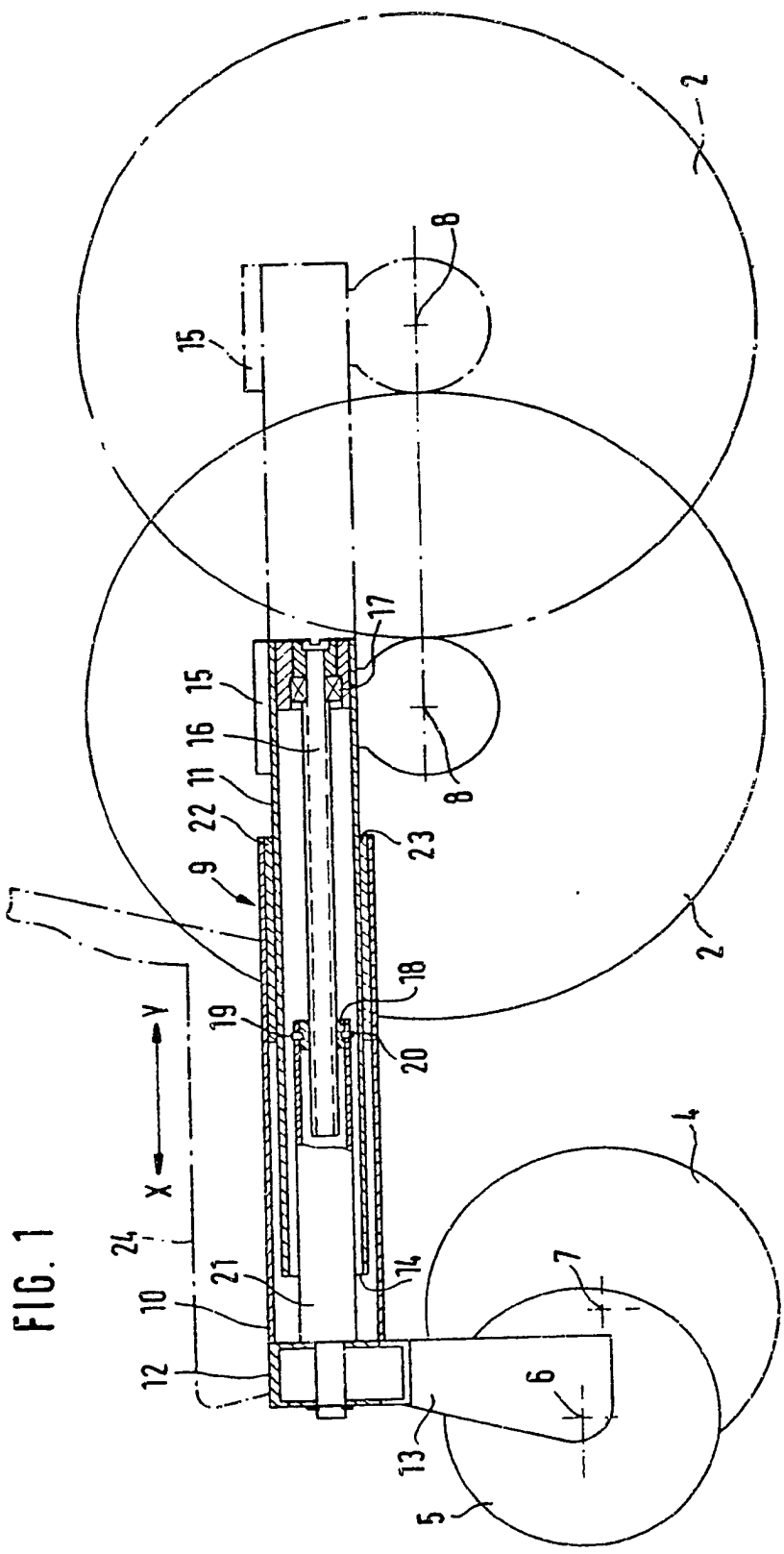

FIG. 1

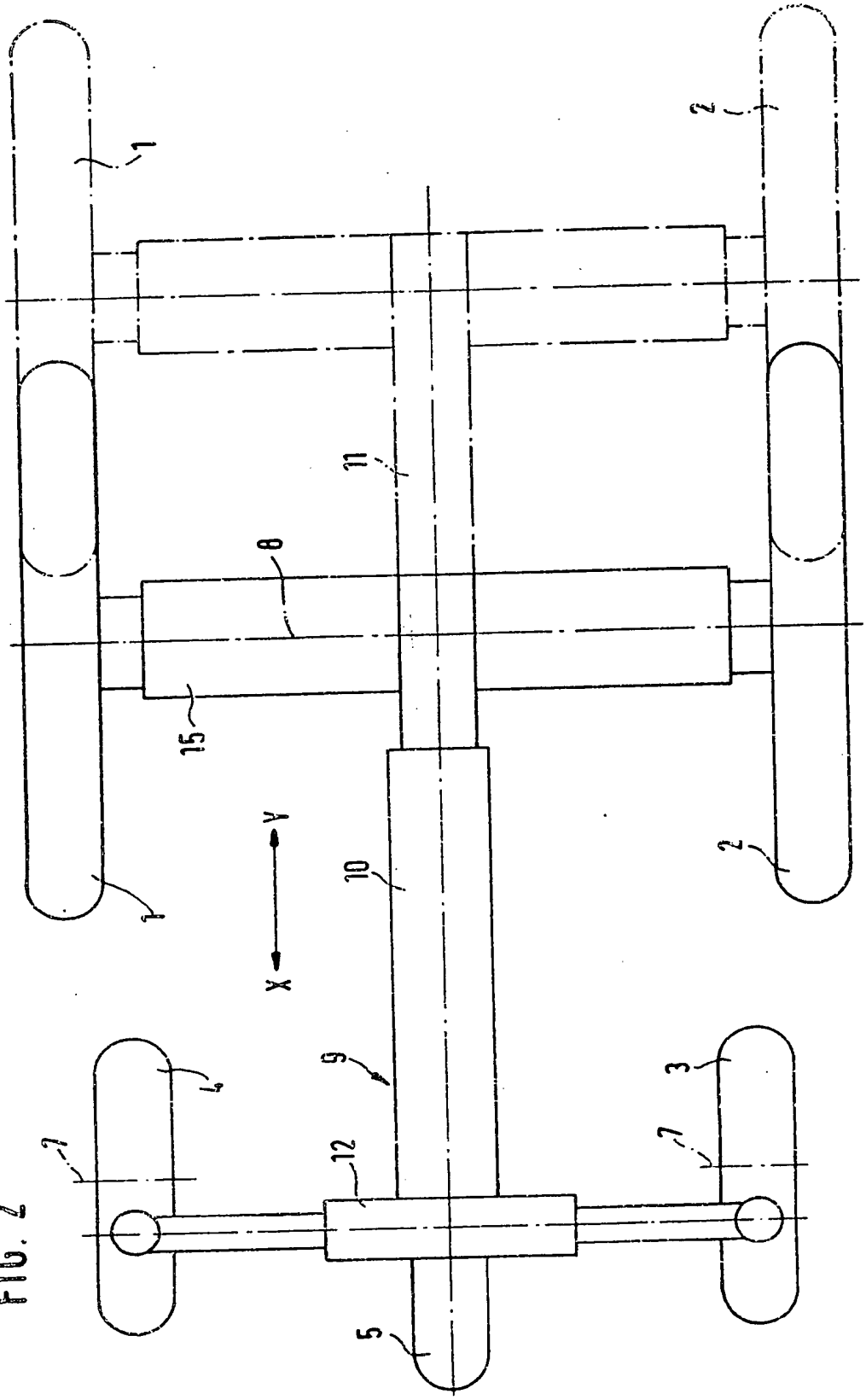

FIG. 2

SPECIFICATION

Wheelchair

This invention relates to a wheelchair e.g. for a disabled person, comprising a chassis, mounting front and rear wheels and a seat. Conventional wheelchairs e.g. for the disabled comprise front and rear wheels mounted in sets of two, at a spacing from each other and parallel to each other, the rear wheels mounted in the region of the seat generally being larger in diameter than the front wheels. Moreover, wheelchairs for the disabled are known wherein, between the front wheels there is provided a guide wheel which is usually larger in diameter than the front wheels but which normally does not touch the ground and is intended solely for negotiating kerbs and the like.

A disadvantage of traditional wheelchairs is that the location of the centre of gravity of the seat is always the same. Since the users of these wheelchairs, who are frequently paraplegics, use them both in the home and also on the street, the chairs must be highly manoeuvrable, on the one hand, to enable them to be used by the patient in his home, but on the other hand they must also be roadworthy. Therefore, wheelchairs of this kind are often also motor-driven. On account of the manoeuvrability required, the chassis should not normally be too long in construction, i.e. the wheelbase must be relatively small in view of the good manoeuvrability which is required for use in the home. This relatively small wheelbase is, however, a disadvantage when the user is using the wheelchair on the street on his own, for example. When he negotiates obstacles, particularly kerbs, the unfavour-l position of the centre of gravity may result in the wheelchair tipping over.

According to the invention there is provided a wheelchair comprising a chassis with wheels arranged at the front and rear thereof, and a seat, wherein the relative position of the seat and at least the rear wheels is adjustable.

With a wheelchair in accordance with the invention it is possible to vary the centre of gravity since the relative position of the seat and at least the rear wheels is adjustable. The user thus has the option of setting the wheelchair differently for use e.g. in the home than for use e.g. in the street. If, for example, he wishes to negotiate an obstacle such as a kerb, the spacing between the seat and the rear wheels may be increased so as to increase the stability against tipping of the wheelchair. A wheelchair in accordance with the invention may include its own drive means and is equally suitable for use in the home and also on the street.

Whilst it is envisaged that the relative position of the seat may be adjusted by adjusting the position of the seat itself relative to the front and rear wheels, in a particularly advantageous embodiment the relative position of the seat and the rear wheels is adjusted by varying the length of the chassis. The user can therefore make his wheelchair shorter for use e.g. in the home than in the street. This meets the requirement for good manoeuvrability in the home. On the other hand, increased length of the wheelchair in the street is of no significance. Rather, this greater length results in a favourable change in the stability and straightness of steering. Therefore, the disabled person in the street will normally use a longer chassis length which effectively provides a displacement of the centre of gravity of the seat towards the front wheels relative to the rear wheels.

Preferably the chassis is infinitely variable in length. This permits sensitive adaptation to the conditions prevailing such as, for example, body weight, the obstacle to be negotiated, the space available, etc.

The variation in the length of the chassis can advantageously be achieved by using a linear motor. A linear motor of this kind may be electrically driven, e.g. by a battery. It does not matter whether the linear motor is driven by the main drive motor of the wheelchair or by a separate motor drive.

However, instead of this, it is also possible to use a piston-cylinder unit which can be actuated at both ends alternately by the pressure of a pressure medium, e.g. hydraulic oil. In this case, a motor drives a pump which, depending on the desired direction of displacement, causes pressure medium to act on a piston at one end or the other and thereby effect the adjustment. The adjustment may be arrested by means of the column of pressure medium or by an additional locking means, for example a clamping cam, a bolt or the like.

In an alternative embodiment a worm gear is used to adjust the chassis length. For example, a spindle may be constructed and arranged so as to rotate, being motor-driven, and to engage a spindle nut which is non-rotationally connected to a longitudinally movable part of the chassis. The chassis may comprise sections which fit telescopically inside one another so as to be variable in length and may be mounted coaxially with one another. The spindle nut and spindle are conveniently also mounted coaxially with these sections, so as to produce a compact construction which does not take up much room.

An embodiment of the invention will now be described by way of example only with reference to the accompanying drawings, wherein:

Figure 1 is a schematic side elevation of a wheelchair, partly in cross-section; and

Figure 2 is a schematic plan view of the wheelchair of Fig. 1 in which the chassis is shown in continuous lines set to the shortest

wheelbase, whilst the broken lines indicate the position of maximum extension.

Referring to the drawings, a wheelchair comprises wheels 1, 2 which are at the rear in the direction of travel and which are larger in diameter than the front wheels 3, 4. Between the front wheels 3, 4 there is a central guide wheel 5 which is mounted so as to be rotatable about a horizontal axle 6. The guide wheel 5 is used solely for negotiating obstacles, e.g. kerbs and generally does not come into contact with the ground since the horizontal axle 6 is upwardly offset relative to the horizontal axle 7 of the front wheels 3, 4. The horizontal axle of the rear wheels 1, 2 is indicated diagrammatically by reference numeral 8.

The chassis of the wheelchair is generally designated 9.

As can be seen from Fig. 1, the chassis 9 has telescopically interengaging frame sections 10, 11 which are mounted coaxially with one another. The frame section 10 is integrally connected by welding to a transverse bar 12 on which the axle 6 is mounted via an intermediate member 13. The axle 7 and hence the front wheels 3, 4 are also connected by suitable means to the frame section 10 via the transverse bar 12, although the mounting arrangement of the axle 7 is not shown in detail in the drawings.

The frame section 11, the front end 14 of which is arranged so as to be spaced from the transverse bar 12 even in the contracted condition of the wheelchair, is mounted at a radial spacing from the inner wall of the frame section 10. The frame section 11 is integrally connected by welding to a rear transverse bar 15 with which the axle 8 and hence the back wheels 1 and 2 are associated. A spindle 16 is rotatably mounted in a bearing 17 in the frame section 11, coaxially with the frame sections 10 and 11. The spindle 16 can be driven in both directions of rotation by means of a motor drive (not shown).

A nut 18 meshes with the spindle 16, this nut being non-rotationally and fixedly connected to a tube 21 by means of bolts 19, 20, whilst the tube 21 is connected to the transverse bar 12. Reference numerals 22 and 23 designate guide members arranged at a spacing from one another and fixedly connected to the frame section 10. Fig. 1 clearly shows that the guide member 23 is mounted in the region of the free end of the frame section 10.

A seat 24 (shown only diagrammatically) for the user is connected to the frame section 10 between the axles 6 and 8.

It can be seen that, by rotation of the spindle 16, the frame sections 10 and 11 can be moved towards each other in the direction X or Y. In this way the spacing of the axles 6 and 8 relative to one another and hence the position of the centre of gravity of the seat 24 in relation to the axles 6 and 8 can be varied.

Fig. 2 shows the shortest condition of the chassis in solid lines, in which the frame sections 10, 11 have been moved together in direction X, i.e. to give the shortest wheelbase, so that the seat 24 is located relatively close to the axle 8 of the rear wheels 1, 2. If the spindle 16 is motor-driven so that the frame section 11 moves in direction Y, the spacing of the seat 24 from the rear axle 8 is increased, i.e. the position of the centre of gravity is effectively shifted forwards relative to the rear wheels 1, 2. This position of the centre of gravity will be adopted for negotiating obstacles, e.g. kerbs, in order to increase the stability against tipping of the wheelchair.

The spindle 16 can be driven by a motor which also drives the wheels. However, it is also possible to provide a separate drive motor for the adjustment of the frame sections 10, 11.

CLAIMS

1. A wheelchair comprising a chassis with wheels arranged at the front and rear thereof, and a seat, wherein the relative position of the seat and at least the rear wheels is adjustable.

2. A wheelchair as claimed in claim 1, wherein the relative position of the seat and at least the rear wheels is adjusted by varying the length of the chassis.

3. A wheelchair as claimed in claim 2 wherein the chassis is infinitely adjustable in length.

4. A wheelchair as claimed in claim 2 or 3 wherein the chassis is longitudinally adjustable by means of at least one linear motor.

5. A wheelchair as claimed in any preceding claim wherein said adjustment is effected by means of a piston-cylinder unit which is actuable in response to fluid pressure.

6. A wheelchair as claimed in any of claims 1 to 5, wherein said adjustment is effected by means of a worm gear.

7. A wheelchair as claimed in claim 2 wherein the chassis comprises frame sections which engage in one another, the front wheels being connected to one frame section whilst the rear wheels are connected to the other frame section.

8. A wheelchair as claimed in claim 7, wherein the frame sections and a worm gear arranged to vary the length of the chassis are mounted coaxially with one another.

9. A wheelchair substantially as herein described with reference to the accompanying drawings.

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